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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/553,756

10/17/2006

Masaki Okamura

125679

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25944 7590 03/26/2010

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P.O. BOX 320850

ALEXANDRIA, VA 22320-4850

EXAMINER

BEHM, HARRY RAYMOND

ART UNIT

PAPER NUMBER

2838

NOTIFICATION DATE

DELIVERY MODE

03/26/2010

ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

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Office Action Summary	Application No. 10/553,756	Applicant(s) OKAMURA ET AL.	
	Examiner HARRY BEHM	Art Unit 2838	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 2/25/10.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 12, 13, 15-18, 20-23, 25, 27, 28 and 30 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 12, 13, 15-18, 20-23, 25, 27, 28 and 30 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|-------------------------------------------------------------------------------------|-------------------------------------------------------------------|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 2/25/10 has been entered.

Response to Arguments

Applicant's arguments with respect to the amended claims have been considered but are moot in view of the new ground(s) of rejection.

Allowable Subject Matter

The indicated allowability of claims 13, 15, 17-18, 20-23, 25, 27, 28 and 30 is withdrawn in view of the newly discovered reference(s) to Collier-Hallman (US 7,190,135). Rejections based on the newly cited reference(s) follow.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 12-13 and 15-18, 20-23, 25, 27-28 and 30 are rejected under 35 U.S.C. 103(a) as being unpatentable over De Doncker (US 5,373,195) in view of Collier-Hallman (US 7,190,135).

With respect to Claim 12, De Doncker discloses a voltage conversion device (Fig. 2) variably changing an input voltage (Fig. 2 +dc link) to be applied to an inverter (Fig. 2 10) driving a motor (Fig. 2 14), comprising: a voltage converter (Fig. 2 20) executing voltage conversion between a power supply (Fig. 2 22) and said inverter; and a control device (Fig. 2 40) controlling a switching duty of an upper arm (Fig. 2 TB1) and a lower arm (Fig. 2 TB2) included in said voltage converter (Fig. 2 20). De Doncker does not disclose the duty cycle as the desired output voltage of the dc link approaches the supply voltage from the battery.

Collier-Hallman discloses a voltage inverter topology with a control device (Fig. 3 130) controlling a switching duty of an upper arm and a lower arm included in said voltage inverter so that an influence of a dead time of said voltage converter is removed (column 5, lines 26-35), when a voltage command value (Fig. 3 Vdesired) is low (column 2, lines 8-17). While Collier-Hallman does not describe a voltage boosting topology as disclosed by De Doncker, it would have been obvious to one of ordinary

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skill in the art at the time of the invention to remove the influence of the dead time from a voltage boosting topology when a command value is low such that when a voltage command value of said voltage conversion is at least a power supply voltage [analogous to the second good operating point of Collier-Hallman column 3, lines 5-15] and at most a predetermined voltage [analogous to the first good operating point of Collier-Hallman], wherein said predetermined voltage is a minimum voltage that can secure the dead time [exhibit acceptable ripple and linearity above the threshold value], of said voltage converter, and said control device controls said voltage converter by fixing said switching duty [since the reference voltage V_{ref} is adjusted to one of the two operating points the duty cycle is fixed to the corresponding fixed duty cycles associated with the first and second operating points] when said voltage command value is at least said power supply voltage and at most said predetermined voltage. The reason for doing so was to remove the effects of the dead time when the voltage command was low as taught by Collier-Hallman (column 1, lines 60-65).

With respect to Claim 13, De Doncker in view of Collier-Hallman disclose a voltage conversion device changing an input voltage applied to an inverter as described above, wherein said predetermined voltage [threshold voltage] is a product of the power supply voltage and a control period length, divided by an effective control period length, the effective control period length being determined by subtracting the dead time from the control period length [first good operating point column 3, line 9].

With respect to Claim 15, De Doncker in view of Collier-Hallman disclose a voltage conversion device changing an input voltage applied to an inverter driving a motor as set forth above.

With respect to Claim 16, De Doncker in view of Collier-Hallman disclose a voltage conversion device as set forth above wherein said voltage converter linearly changes said input voltage by changing the reference voltage (Fig. 6A, 6B V_{ref} effectively changed to the desired linear value by modulating between the two good operating points with the appropriate duty cycle].

With respect to Claim 17, De Doncker in view of Collier-Hallman disclose a voltage conversion device as set forth above wherein said maximum effective on-duty corresponds to the first good operating point and the longest on-duty corresponds to the second good operating point.

With respect to Claim 18, De Doncker in view of Collier-Hallman disclose a voltage conversion device as set forth above, wherein the duty cycle is fixed to one of two duty cycles by forcing the reference voltage to one of two values to remove the influence of the dead time.

With respect to Claim 20, De Doncker in view of Collier-Hallman disclose a voltage conversion device as set forth above, wherein the appropriate duty cycle is the maximum effective on duty [corresponding to the first good operating point] or the longest on duty corresponding to the second good operating point].

With respect to Claim 21, De Doncker in view of Collier-Hallman disclose a voltage conversion device as set forth above. See claim 16 for additional details.

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With respect to Claim 22, De Doncker in view of Collier-Hallman disclose a computer readable medium (Collier-Hallman column 8, lines 40-45) as set forth above wherein the controller performs secondary modulation (Fig. 3 130) to adjust the voltage reference to remove the influence of the dead time. Collier-Hallman does not require for the duty cycle be computed based on $V_{desired}$ before the reference voltage is corrected to V_{ref} . That is Collier-Hallman discloses correcting the desired reference voltage to $V_{desired}$ to V_{ref} before computing the duty cycle, and compares the computed reference voltage to the limits instead of comparing the corresponding duty cycles to limits. Nevertheless, it would have been obvious to one of ordinary skill in the art at the time of the invention to compare the corresponding duty cycle instead of the voltage reference. The reason for doing so was the limitation of the step of "determining if said first on-duty is influenced by said dead time" which is really determining if the on-duty corresponding to a desired reference voltage is influenced by said dead time, presents no novel or unexpected result over the comparisons used in the references. Use of such a means of comparison in lieu of those used in the references solves no stated problem and would be an obvious matter of design choice within the skill of the art. In re Launder, 42 CCPA 886, 222 F.2d 371, 105 USPQ 446 (1955); Flour City Architectural Metals v. Alpana Aluminum Products, Inc., 454 F. 2d 98, 172 USPQ 341 (8th Cir. 1972); National Connector Corp. v. Malco Manufacturing Co., 392 F.2d 766. 157 USPQ 401 (8th Cir.) cert. denied, 393 U.S. 923, 159 USPQ 799 (1968).

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With respect to Claims 23, 25, 27-28 and 30, De Doncker in view of Collier-Hallman disclose a computer readable medium as set forth above. See claims 1, 16, 20 and 22 for additional details.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to HARRY BEHM whose telephone number is (571)272-8929. The examiner can normally be reached on 7:00 am - 4:00 pm EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Monica Lewis can be reached on (571) 272-1838. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Harry Behm/
Examiner, Art Unit 2838